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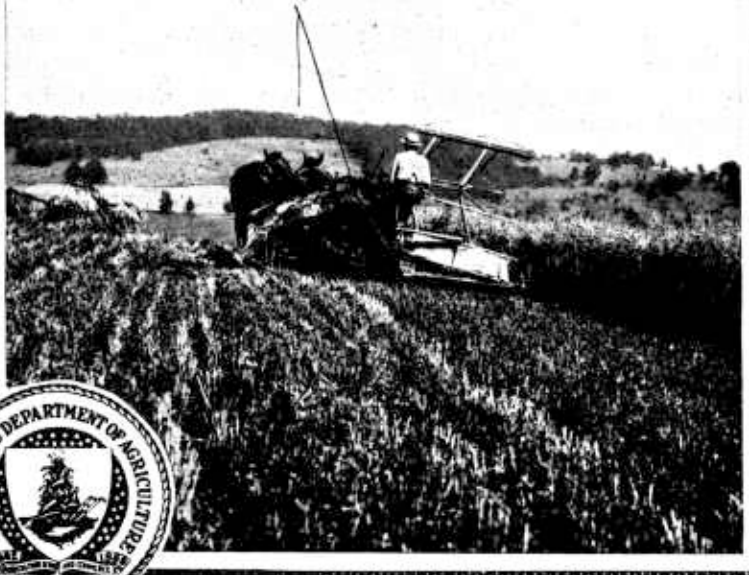
OATS in the NORTHEASTERN STATES



OATS HAVE BEEN GROWN in the Northeastern States since early colonial days. To-day they constitute the third most important cereal crop of the area, occupying approximately 3,000,000 acres annually. Oats have maintained an important place in the agriculture of this region in spite of their comparatively low acre value (1) because they fit so well into existing rotations and (2) because of their value as feed for work stock and dairy animals. The use of improved cultural methods and varieties should increase acre yields and therefore make the crop relatively more satisfactory.

The requirements for growing oats successfully in the Northeastern States are:

A well-prepared seed bed on fairly productive land.

The rational use of farm manures and commercial fertilizers in producing the crop.

Growing oats in a rotation with legumes and row crops.

Clean, viable seed of adapted high-yielding varieties treated for smut.

Early seeding, preferably with a grain drill.

Harvesting the crop at the best time for yield and quality.

Protecting grain and straw from the elements by attention to details in shocking, stacking, and storage.

Careful threshing.

Directions for making the production of oats more profitable in the Northeastern States are given in the following pages.

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OATS IN THE NORTHEASTERN STATES

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IMPORTANCE OF THE CROP

OATS HAVE BEEN GROWN in the Eastern and Northeastern States since early colonial days. In States like New York and Pennsylvania, oats constitute the third most important cereal crop, being exceeded in grain production only by corn and wheat. Approximately 3,000,000 acres of oats are grown annually in the northeastern oat area. As is true in other regions, oats are not very profitable in actual cash returns. Nevertheless, they fit so well into existing rotations and are such a valuable feed for horses, dairy cows, young stock, and poultry that the crop occupies an important place in the agriculture of this region. The average acre yield for this region is approximately the same as that for the entire United States. Owing to a relatively smaller acreage per farm, the more general use of improved cultural methods and varieties should result in producing more and better oats per acre. The northeastern and other oat areas in the United States are shown in Figure 1.

SOILS FOR OATS

Some of the soils of this area have been cultivated for more than two centuries. However, with proper handling and rational fertilization they still are capable of producing excellent yields of oats and other crops. Frequently in oat production, proper climatic and cultural conditions are more important than the character or even the fertility of the soil. Because of their greater water-holding capacity, clay and loam soils are better than sandy soils for oats. Sandy soils that have been well supplied with plant food and have a subsoil of moderately fine texture will produce satisfactory crops of oats. The

heavier, undrained clay soils occurring in some sections of this area frequently are too wet and cold for the best growth of the oat plant. The heavy clay loams, which are quite common in this area, are well adapted to oats. Land that naturally retains moisture or that is well filled with humus should be used, as oats have a high water requirement. Oats lodge easily and should not be grown on very rich or on low, undrained land. Oats grown on poorly drained, wet soils may be injured by plant diseases, especially rusts, mildew, etc. The crop usually does well on the well-tilled soils of the less hilly sections of Pennsylvania and New York, such as that shown on the title-page and in Figure 2.

FERTILIZERS AND MANURES

Although oats respond well to liberal fertilization, it usually is more profitable to apply fertilizers to other crops in the rotation.

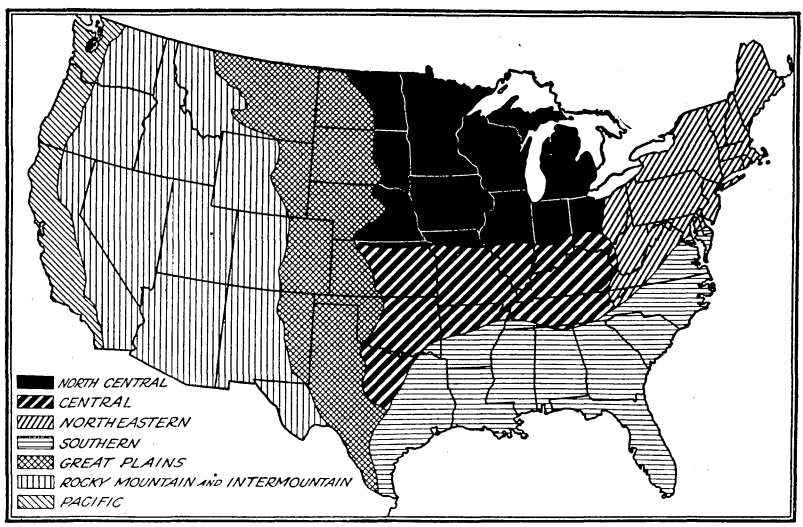

FIGURE 1.—Outline map showing the northeastern and other oat areas of the United States

Under some conditions, however, it may be profitable to apply fertilizers directly to the oat crop. Ordinarily in this area oats do not suffer because of too great a supply of nitrogen, as is true on the more productive soils of the Corn Belt.

Unless the soil is exceedingly low in fertility, the direct application of barnyard manure to oats is rarely advisable. Usually more satisfactory results are obtained by applying manure to some other crop in the rotation, such as corn or potatoes, than by making application directly to the oats. The oats then will profit by the residual effect of the manure and the added humus in the soil and will be less likely to produce a rank growth of straw which may lodge and thus reduce grain production. It will be safe to apply well-rotted stable manure at the rate of 10 to 15 tons per acre on the poorer soils of this general region a few months previous to sowing the oats. The use of some phosphate with manure usually is advisable. As a rule,

superphosphate is more profitable than rock phosphate to supplement manure.

These old soils usually are deficient in one or all of the three most important plant nutrients; that is, nitrogen, phosphorus, or potassium (potash). These must be replenished for satisfactory crop production. Phosphorus is more frequently not present in sufficient quantities for the satisfactory production of oats. Most soils in the Eastern and Northeastern States are deficient in phosphorus, and it must be supplied by the application of manure or commercial fertilizer.

Small quantities of nitrogen or nitrogenous fertilizer can be used on the oat crop to advantage, especially where neither stable manure nor green manure is available. Where nitrogen in commercial form is applied to oats at seeding time it is better to use some readily

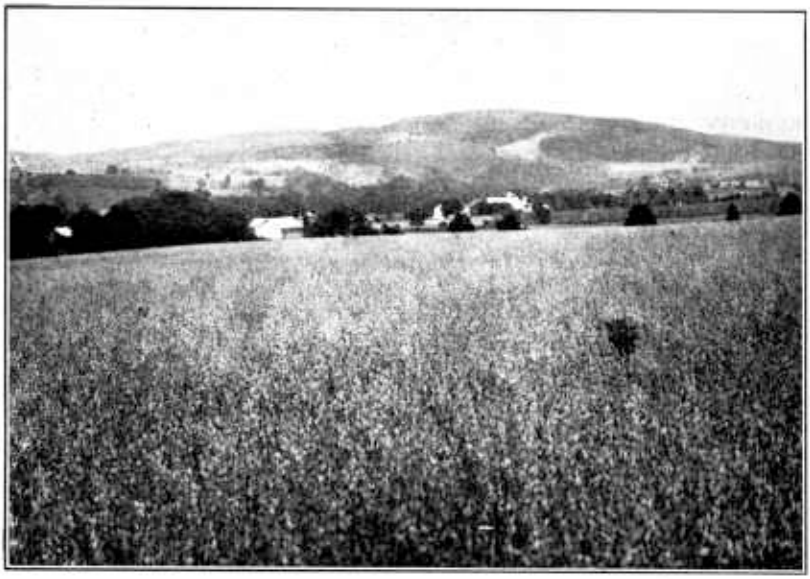

FIGURE 2.—A field of excellent oats about ready for harvest near Sunbury, Pa.

available form, since soil nitrogen ordinarily does not become available until later in the season. Potash ordinarily can be applied more profitably to some other crop in the rotation, such as corn or wheat. This plant nutrient usually is present in sufficient quantities in clay soils. However, in the more gravelly and sandy soils of this region there frequently is a deficiency of potash, in which case it should be supplied in some commercial form.

Frequently a complete fertilizer—one containing nitrogen, phosphorus, and potash—is used on the oat crop in this region. A good combination on average soils is one containing from 50 to 100 pounds of nitrate of soda, 200 to 250 pounds of superphosphate (acid phosphate), and 40 to 80 pounds of muriate or other potash salts, applied 200 to 300 pounds to the acre. On the heavier loam and clay soils potash may be omitted. On farms where some barnyard manure is available the best results with oats ordinarily are

obtained by applying 200 to 250 pounds of superphosphate. In any region where the nitrogen and potash content of the soil is taken care of by proper crop rotation and good cultural methods the application of 150 to 200 pounds of superphosphate usually is one of the most satisfactory fertilizer treatments for oats. Where oats are being grown on land fairly high in nitrogen the straw may be stiffened by the use of small quantities of potash and phosphorus, preferably in the form of muriate of potash and superphosphate, respectively. Under any condition the quantity of fertilizer to be applied and the proportion of the different fertilizer elements to be used depend primarily on the nature and fertility of the soil and the local price of fertilizers.

Where oats are desired for forage rather than for grain production, the use of barnyard manure or fertilizers high in nitrogen is sometimes advisable. The nitrogenous fertilizers induce a rank growth of straw which is necessary for the production of large yields of forage.

On very acid soils, or when green-manure crops or stable manure are used, the application of lime may have a beneficial effect on oats. Ordinarily, liming alone will not increase the yield of oats. The function of lime is to correct soil acidity and to improve the physical condition of the soil and thus make it more favorable for the growth of the oat plant. Lime or fertilizers applied to oats may not be directly profitable; yet increased yields obtained from succeeding crops frequently make up the deficiency where clover or grass usually follow oats. This is particularly true in the Northeastern States.

OATS IN THE ROTATION

Any rotation for oats should include both a cultivated and a legume crop. In the Northeastern States oats seldom are sown after grass, as corn or other row crops occupy this place in the rotation to better advantage. Oats are grown here, as elsewhere, mainly because of their value in rotations. No other crop is so satisfactory to follow corn as oats. In much of this area corn matures too late to be followed satisfactorily by winter wheat. As a result, a large acreage of corn-stubble land is sown to oats the following spring with the major purpose of getting the land back to grass, oats being a satisfactory nurse crop for grass and clover in this region. Oats also furnish feed and straw for use on the farm.

The yield of oats also usually is less affected by the preceding crop than are yields of corn, wheat, barley, etc. Owing to this fact, rotations most often are arranged for the benefit of the other major crops rather than for oats.

One of the most common rotations in this area consists of corn, oats, and grass or clover. This usually is a 4-year rotation, the clover and grass remaining as a meadow or pasture for two or more years. Oats also frequently follow potatoes in a similar 4-year sequence, the oats in turn being followed by grass and clover. Where winter wheat is grown the rotation may consist of corn, oats, winter wheat, and grass. In this rotation winter wheat serves as a nurse crop, the grass seed being sown in the fall with the wheat, and the clover the next spring.

Soybeans, being an intertilled crop, have not replaced oats to any extent in the southern portion of this area. Further information on crop rotation in farming economy and the use of rotations in maintaining and improving soil productivity is given in Farmers' Bulletin 1475, Soil Productivity as Affected by Crop Rotation.

OATS IN MIXTURES WITH OTHER CROPS

Oats occasionally are grown in combination with other crops for either hay or grain. In this particular area a common combination is oats and Canada field peas. One bushel of oats and 1½ bushels of Canada field peas, or an equal mixture at the rate of 2 to 3 bushels to the acre, may be sown. In sections where peas do not grow so well a proportion of 1½ to 2 bushels of oats and ½ bushel of peas is common. The legume and oats in combination may increase both the yield and the feeding value of the crop, in addition to increasing the nitrogen content of the soil. Barley and oats in combination also are grown. When these crops are grown together it is necessary to use an early variety of oats, so that the two will ripen at the same time. Best results usually are obtained from sowing 1 bushel each of oats and barley to the acre.

Where rape will endure summer heat it is sometimes sown with oats, to be used as a pasture for hogs or sheep after the oats are harvested. From 1 to 2 pounds of rape seed to the acre is sufficient. Frequently the rape is sown from two to three weeks after the oats. The seed may be covered by harrowing lightly. Where rape is grown in the oats the oat crop usually is cut with a rather high stubble. Rape pasture is especially satisfactory for sheep.

OATS AS A NURSE CROP

As a nurse crop for clover and grass, oats are used more frequently than any other small grain. Spring seeding of alfalfa in oats is not uncommon in some sections of this area. While oats are not ideal for a nurse crop, because they draw heavily on soil moisture, good results as a rule are obtained. In dry seasons oats may tend to check the growth of the crop sown with them. When oats are used as a nurse crop the selection of fine-strawed, early varieties is desirable. Such varieties grow less rank and remove less water from the soil than larger-growing, longer-season varieties. When oats are sown as a nurse crop it sometimes is advisable to sow less than the ordinary quantity of seed, especially if a good stand of grass is the main objective.

OATS AS A COVER CROP

In the area under consideration oats are used to some extent as a cover crop in orchards. They remove considerable moisture from the soil, checking tree growth and causing young wood to mature fully before cold weather. Oats usually make a rather dense cover, and the close mat of dead plants furnishes considerable winter protection. This cover does not hold snow as well as some other cover crops. Peas or vetch may be sown with the oats when used as a cover crop. The best dates and rates of seeding for these cover crops depend largely on the local conditions and practices.

PREPARATION OF THE SEED BED

Frequently too little attention is given to the proper preparation of the seed bed for oats. In the Northeastern States oats generally follow corn. The land usually is plowed and fitted for seeding by disking and harrowing. In this area oats are sown much less frequently on soil prepared by disking and harrowing than in the Corn Belt. This is partly due to the weedy condition of the land following corn, and partly due to the difficulty of preparing a seed bed on the heavy clay soils of this area. When fall plowing is not feasible the land should be plowed as early as possible in the spring to give some time for the soil to settle and to become firm and compact. The best seed bed for oats consists of from 2 to 3 inches of loose, mellow soil on the surface with a rather firm layer of soil beneath.

FIGURE 3.—Disking fall-plowed land for oats in the northeastern oat area

Wherever serious losses by erosion occur, fall plowing is not advisable. The plant residue remaining on land after harvesting the corn gives some protection against washing in the winter. Disking fall-plowed land for oats is shown in Figure 3.

SEED PREPARATION

CLEANING THE SEED

Seed oats should be fanned and graded. A seed grader or an ordinary fanning mill is satisfactory for preparing the seed. Fanning removes the light oats and trash, while the small oats and most of the weed seeds are removed by the screens. Usually about one-fourth of the oats should be removed by fanning, although when oats are very light as the result of unfavorable seasonal conditions one-third or even one-half of the seed should be removed by grading and fanning. A large percentage of the small, light oats do not contain a kernel and would not germinate if sown. Seed of uniform size is desirable to facilitate accurate operation of the drill or seeder. The

removal of weed seeds by fanning and screening is one of the effective methods for controlling and preventing the distribution of noxious weeds.

TREATING SEED FOR SMUT

Smut in oats frequently reduces yields materially. Two methods of seed treatment with formaldehyde are recommended to control smut. One is the so-called sprinkling method, and the other is the spray method.

If the sprinkling method is used, spread the seed oats on a clean barn floor or canvas, or in a tight wagon body, and sprinkle with a solution made by adding 1 pint of formaldehyde (37 per cent by weight) to 40 gallons of water. While the oats are being sprinkled they should be shoveled from one pile to another until every seed is well moistened, each bushel of seed requiring about 1¼ gallons of the solution. The seed should then be shoveled in a pile and covered with canvas or other covering and allowed to remain for at least two hours, or even overnight. The seed should be sown at once with allowances made in the rate of seeding for the swelling of the seed. If seeding is delayed the oats should be spread on a clean floor to dry.

The spray method differs from the one just described in that the oats are sprayed with a much stronger solution of formaldehyde. Mix 1 pint of formaldehyde (37 per cent by weight) with 1 pint of water and pour into a quart sprayer. This should be sufficient to treat 50 bushels of seed. While the spray is being applied shovel the oats from one pile to another. When spraying is completed, cover the pile with canvas or sacks that also have been sprayed with the solution. This covering should be allowed to remain on the oats for at least five hours, or overnight. The covering should then be removed and the grain should either be sown at once or spread out to aerate, as in the preceding method.

When grain has been treated with formaldehyde for smut disinfection it should not be allowed to come in contact with bins, bags, or machinery in which there may be smut spores. Usually it is advisable to treat the bags and the machinery along with the seed to prevent reinfection. Surplus treated oats may be fed to livestock without injury if spread out and aired for a few days.

For more complete directions in regard to these and other methods of using formaldehyde for smut control, see Miscellaneous Publication 21, Formaldehyde Seed Treatment for Oat Smuts.

Commercial chemical dusts may be used to control oat smuts with good results. These dusts are being used more and more each year because they are effective and also convenient to apply. As a rule, directions for using these dusts accompany the package or container.

SOWING THE SEED

TIME OF SEEDING

Owing to the rather short growing season in much of the area under discussion, especially at the higher altitudes, it is essential that oats be sown early. Late seeding frequently results in poor yields. Early seeding often permits the crop to escape injury from the effect of hot weather when the crop is nearing maturity. Ordinarily, frost or even light freezes after the seed is sown do not injure oats. A

good rule to follow is to sow oats just as soon as the ground is in condition to work in the spring. Usually this can be facilitated by fall plowing.

In the Northeastern States oats usually are sown in April or early in May. However, the best seeding date for any section depends on many factors. Seeding usually is possible around April 15 in West Virginia, western Maryland, Pennsylvania, New Jersey, and New York. In the extreme northern portion and in the more mountainous sections of this area oats frequently are sown in May. In the New England States sowing during the first half of May usually is possible. Good results hardly can be expected if seeding is delayed until after May 15.

RATE OF SEEDING

The rate of sowing oats varies somewhat with locality, condition of the soil, method of seeding, and the size of the seed. On a poorly prepared seed bed more seed is needed than on a well-prepared seed bed. In drilling oats less seed is required than in sowing broadcast, because when sown broadcast many of the seeds are covered either too deeply or not at all and hence fail to germinate. In the Northeastern States the average rate of seeding is about 2½ bushels to the acre. The late, large-seeded varieties sometimes grown in this area should be sown at a rate of 3 bushels or more an acre.

METHOD OF SEEDING

Drilling is the best method of sowing oats. While use of the drill has increased markedly in recent years, a considerable portion of the crop still is sown broadcast. Drilling insures a more uniform distribution of seed as well as uniformity in depth of covering. This results in more even germination and a more uniform growth throughout the season. In dry seasons drilling places the seed in moist earth. Drilling also permits the sowing of clover and grass seed at the same time the oats are sown. If grass seed is not being sown with the oats, broadcasting is a quicker and cheaper method of sowing under some conditions.

The depth to which the seed should be covered depends on the nature of the soil and the amount of moisture it contains. With abundant moisture, shallow seeding from 1 to 1½ inches is sufficient. In loose, sandy loams, which lose their moisture easily, the seed should be placed at a depth of from 1½ to 2½ inches. When oats are sown broadcast the seed usually is covered by a shallow disking or by harrowing the soil with a spike-tooth harrow.

TREATMENT AFTER SEEDING

About the only treatment practiced after seeding in the Northeastern States is rolling. This is not always advisable, especially when seeding has been delayed by excess soil moisture resulting from continuous rains. Rolling sometimes is beneficial when oats have been sown in a very dry, cloddy seed bed.

Large weeds, such as dock and milkweed, sometimes are removed from oat fields by digging or pulling by hand. Although laborious, this is a good practice, as it is one means of weed control. While some oats may be destroyed in weeding, this loss will be more than compensated for by the destruction of noxious weeds and their seeds.

HARVESTING THE CROP

CUTTING

Oats in the Northeastern States usually are cut with a grain binder, although in the rougher and more hilly sections some oats still are cut with the cradle and bound by hand. In other sections cutting with a mower sometimes is necessary, especially if the crop is badly lodged or when the straw is very short, owing to drought or other unfavorable conditions.

The proper time to cut oats is when the grain is in the hard-dough stage and the straw still a little green. Earlier cutting usually results in shriveled grain and reduced bushel weight. If oats are allowed to become too ripe before binding there is danger of loss by shattering. Storms may damage the crop if harvest is delayed unduly. Where oats are cradled, they ordinarily are cut a little green. Sometimes they are allowed to cure a day or two in the swath before being bound. On the other hand, if not too green they may be bound as cradled.

The harvesting of a field of oats of the Ithacan variety in Cortland County, N. Y., is shown in the illustration on the title-page.

SHOCKING

In the area under discussion oats generally are shocked immediately after the binder. The shocks should be capped to prevent damage from rain and dew. If the oats are a little green or weedy, it may be advisable to let them cure for a few hours or a day in the bundle before shocking.

The round type of shock is mostly used in this region, although the long, narrow shock is favored by some farmers. A round shock may be built by several methods. One is to set up two bundles with the flat sides and heads together and the butts a few inches apart. These initial bundles should be set down firmly into the stubble, so they will stand alone. A bundle is then set at each end of the pair so there are four in a row; then a bundle is set in the middle of each side. Next a bundle is set in each of the four angles thus formed, completing the shock except for capping.

A modification of this method is to set the third and fourth bundles at the sides instead of at the ends, as just described. The fifth and sixth bundles are set at the ends and the shock is completed as before. If larger shocks are desired, a few additional bundles may be set around the shocks where they seem to fit best.

One or two bundles may be used in capping. A cap is made by holding a bundle with the butt on the leg above the knee and one forearm and hand under the bundle at the band, while half the straws are broken to the right and half to the left with the other hand. The position of the bundle may be changed so that the straws on the right are broken with the right hand and those on the left with the left hand. The shocks should be capped so that the broken straws of the cap will slant distinctly downward. If a cap of two bundles is used, the second should be placed at right angles to the first with the heads toward the direction of the prevailing winds. Two bundle caps, as a rule, afford better protection from rain and dew. If only one cap is used, the heads should be

placed toward the direction of the prevailing winds. Skill in shocking and capping is especially desirable in the Northeastern States, owing to rains which frequently follow oat harvest. A properly constructed round shock is shown in Figure 4.

The long type of shock is started by setting the first pair of bundles in the same manner as in building the round shock, except that the butts should be set a little farther apart so as to permit free circulation of air lengthwise through the shock after it is completed. The second and third pairs of bundles are then set on opposite sides in a similar manner, with the bundles leaning slightly toward the first pair. Pairs of bundles are then set at each end alternately until the desired number is in place, thus completing the shock. In building a shock of this kind usually from eight to ten pairs of bundles are set up without capping.

FIGURE 4.—A well-built round shock of oats with cap to protect the grain from weathering

STACKING

In the Northeastern States most oats are stored in barns until threshed. Stacking is little practiced, and in some sections it is almost a lost art. Owing to lack of barn space or other shelter, oats sometimes are stacked. It is important that the stacks be well built, otherwise they may not shed water and the grain will be damaged. An improvised foundation built of fence rails, poles, etc., usually is necessary to raise the stack a little above the ground to protect the lower portion of the stack from injury by ground moisture.

Stacking should be started from 10 days to 2 weeks after cutting. A convenient stack size is from 10 to 12 feet at the greatest diameter. Most stackers start building by first setting up bundles, as in making a large shock. Each successive round of bundles is set a little more slanting until a diameter of 10 feet is reached, when the last row will be almost flat. A row of bundles is then laid so that the butts form the outside of the stack base. The next row is laid with heads toward the center, the butts just covering the bands of the outer row. In a similar fashion rows of bundles are laid like shingles until the center is reached, the butts overlapping just a little more with each successive row, so the middle of the stack always will be slightly higher than the rim. Then begin at the outside and proceed as before with each succeeding layer.

In laying the outside row of bundles around the lower portion of the stack the bundles should be laid with the long straws of the butt

on top. This will increase the diameter of the stack with each layer and form a bulge. After a height of 6 to 8 feet is reached the process should be reversed, the long straws of the butt being laid beneath, in this way gradually decreasing the diameter of the stack with each successive layer. The stack when so built tapers to a point when finished.

The most important essential in stacking is to keep the middle of the stack high and well tramped at all times. The outer rows of bundles should not be tramped at all. If there is danger of slipping, the so-called double and triple rows sometimes are laid in placing the bundles near the edge. Instead of laying just one row, two or three rows are laid in their proper position at one round of the stacker, the maximum number of bundles being thus laid with the minimum of tramping near the edge of the stack.

In completing the stack, the capsheaf or top bundle should be secured by driving sharpened stakes into the top of the stack. Stacks in this area sometimes are protected by being covered with tarpaulins.

THRESHING

When oats are stored in barns, threshing may be done when most convenient and usually after they have gone through the sweat and are cured completely in the mow. The thresher should be cleaned before threshing is begun to prevent the mixing of varieties and the dissemination of noxious weed seeds from one farm to another. Where oats of improved varieties are being produced, especially for seed purposes, too much care can not be given to avoiding mixing. The essentials of good threshing are the removal of all grain from the straw without undue cutting of the hulls from the kernels by the cylinder teeth and being sure that the separator is cleaning the grain reasonably well.

COMBINING

In recent years the use of the combine (combine harvester-thresher) for harvesting small grains has spread to all sections of the United States. An increasing acreage of oats is being harvested with the combine in the Northeastern States each year. Oats must be fully ripe before being combined. Ordinarily, when all greenness has left the straw and the glumes turn a dull white, combining should begin. If combined earlier or when too wet, the grain may spoil in the bin.

OAT STRAW

In the Northeastern States oat straw is of considerable value as forage and also as bedding for livestock. Usually, all oat straw is saved. It is protected from weathering either by being stored in barns or sheds or by being carefully stacked. Owing to its greater palatability, oat straw is preferable to other cereal straws as roughage for livestock. All oat straw not needed for roughage should be converted into manure and returned to the land.

By using a bunching attachment, oat straw may be saved when the grain is harvested with a combine. The straw is dropped in bunches which can be loaded conveniently on wagons and hauled to barn or stack. A hay loader may be used in picking up and loading the straw.

VARIETIES

The adaptation of different varieties to certain definite conditions of climate and soil is one of the most important considerations in the production of oats. The lack of satisfactory adapted varieties tends to limit the acre yield of oats in the Northeastern States. Relative

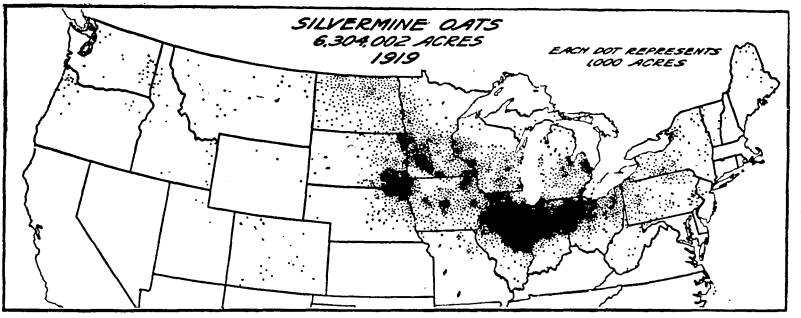

FIGURE 5.—Outline map showing distribution of Silvermine oats in 1919. This variety ranked second in importance to Swedish Select in the Northeastern States in 1919

productivity largely determines the place and usefulness of a variety. Other desirable characteristics that contribute to productiveness are disease resistance, stiff straw, and thin hull. Poorly adapted and inferior varieties should not be grown.

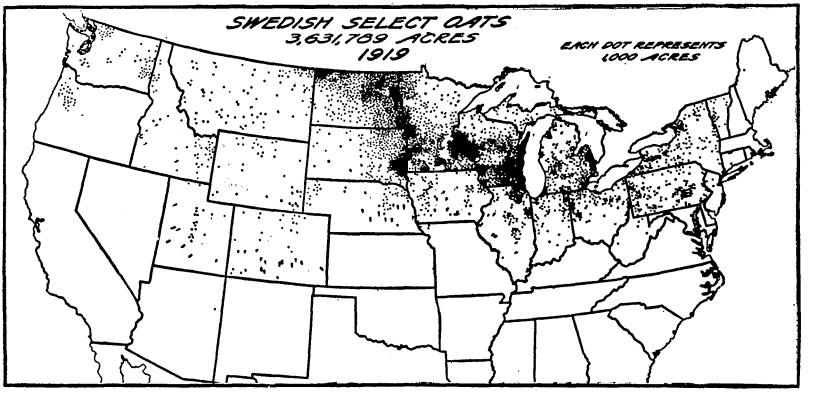

FIGURE 6.—Outline map showing distribution of Swedish Select oats in 1919, the leading variety grown in the Northeastern States at that time. The improved varieties, such as Keystone and Patterson in Pennsylvania, Cornellian, Ithacan, Upright, and others in New York, and Maine No. 340 in Maine, have replaced Swedish Select and Silvermine varieties to a considerable extent since 1919

VARIETAL FORMS

Oat varieties usually are grouped as early, midseason, or late in maturity. Of these three groups, the midseason varieties are of most importance in the northeastern area. Nearly all of these varieties have an equilateral or branching panicle. The late varieties with side or horse-mane panicle are less productive, and they are being grown less extensively than formerly in this area.

The early varieties, Kherson and Sixty-Day, and selections from them, such as Iowar and Gopher, are well adapted to the climatic and soil conditions of the southern portion of the northeastern oat area. Experimental data show, however, that these early varieties are not as productive on an average as the larger and slightly longer-growing types, such as Silvermine, Swedish Select, and Victory, in northern Pennsylvania, in New York, and in the New England States. The distribution of the standard varieties Silvermine and Swedish Select in the United States in 1919 is shown in Figures 5 and 6, respectively.

IMPROVED VARIETIES

For many years standard midseason, white-kerneled varieties, such as Silvermine, Swedish Select, Irish Victor, and Welcome, have been largely grown in this area. In recent years a number of new and improved varieties and strains have been developed. The Office of Cereal Crops and Diseases, Bureau of Plant Industry, United States Department of Agriculture, in cooperation with the department of plant breeding at Cornell University, has developed the following varieties: Cornellian, Comewell, Empire, Ithacan, Standwell, and Upright. Panicles and spikelets of the Cornellian and Upright varieties are shown in Figure 7.

Cornellian (Reg. No. 50).—This is one of the most popular of the new varieties grown in this region, especially in New York. It originated as a pure-line selection from a mixed variety called Canada Cluster. Cornellian produces a rather tall straw with slender, awnless, gray kernels. Its superior characteristics are high yield and low percentage of hull. Cornellian has the added advantage of being easily identified and maintained in a pure condition. It is recommended primarily for growing in New York State. Little or no objection is offered to the gray color of the kernels, as most oats in that State are fed to domestic animals on the farms where they are grown. Cornellian has proved to be ideal for growing in combination with Alpha barley for a grain mixture. Both are high-producing varieties and ripen at approximately the same time.

Comewell (Reg. No. 54).—This oat originated as a head selection from the Welcome variety. It is a midseason, white-kerneled variety of the Silvermine type. Because of its high yield and high test weight, Comewell has been grown considerably in New York; yet newer and still more satisfactory varieties are being developed and distributed which are now replacing it.

Empire (Reg. No. 55).—This selection originated as a head selection from Big Four, a midseason, white-kerneled commercial variety. It is similar to Comewell in plant and kernel characters. Its superior qualities are high yield and high test weight per bushel.

Ithacan (Reg. No. 58).—This oat resulted from a head selection of the National variety. It is a midseason white oat, similar to Silvermine. It is a promising variety in a number of sections in New York State.

Standwell (Reg. No. 60).—This oat originated as a head selection from Lincoln. It is a midseason white oat, resembling Lincoln, and is popular in New York State because of its quality, yield, and rather stiff straw. It has outyielded Silvermine by an average of about 5 bushels per acre.

Upright (Reg. No. 61).—This variety resulted from a pure line of the old oat known as American Beauty, which has been grown for years in Jefferson County, N. Y. It is similar to Scottish Chief, a midseason, white oat, formerly grown in New York and adjacent States. Its stiff straw and high yielding ability have made it popular on dairy farms where considerable manure is applied to the land. Its ability to stand up where most other varieties lodge is its most valuable asset.

In addition to the above-mentioned varieties, other improved strains have been developed independently by State agricultural experiment stations. Among the most important of these are Patterson

and Keystone, developed by the Pennsylvania station, and Maine No. 340, developed by the Maine station. Victory, an introduced improved variety from Sweden, also should be mentioned. Panicles and spikelets of the Patterson and Maine No. 340 oat varieties are shown in Figure 8.

FIGURE 7.—Panicles and spikelets of the Cornellian (A) and Upright (B) oat varieties

Keystone (Reg. No. 68).—Keystone is a pure line of an oat that has been grown in Pennsylvania for many years under the name of Japan. Keystone is early to midseason in maturity and produces yellowish-white kernels. It is best adapted to southern Pennsylvania.

Patterson (Reg. No. 69).—This variety has the same history as Keystone and is similar in plant characters. However, it has shown a rather more general adaptation throughout Pennsylvania and probably is the better variety.

Maine No. 340.—This is a pure-line selection from the old variety known as Irish Victor. It is a midseason, midtall variety with yellowish-white kernels.

It is the most important variety grown in Maine. Its superior yielding qualities, combined with a fairly stiff straw, have met with high favor among New England farmers.

Victory.—A selection from the old Probsteier variety, developed about 25 years ago at the Swedish Experiment Station at Svalof, Sweden. Victory is a midseason to late high-yielding variety with a fairly stiff straw and excellent kernel characters. It has been an important variety in the Northeastern States.

FIGURE 8.—Panicles and spikelets of the Patterson (A) and Maine No. 340 (B) oat varieties

In the western part of Virginia and in West Virginia and the northern tier of counties in Maryland improved early varieties developed in the Corn Belt section, such as Gopher, Iowar, and Richland (Iowa No. 105), have shown high yielding ability and are replacing to some extent the larger midseason varieties that have been grown most extensively in these sections. In New Jersey early oats also

are to be recommended. Fulghum (Kanota), an early red oat, in recent varietal tests at the New Jersey Agricultural Experiment Station, New Brunswick, has shown promise of being a valuable variety. One objection to these early, short-strawed oats throughout the Eastern and Northeastern States has been their low yield of straw. As a by-product oat straw is relatively valuable for both forage and bedding. As a result, the later varieties with taller and larger stems frequently are grown to obtain a higher straw yield.

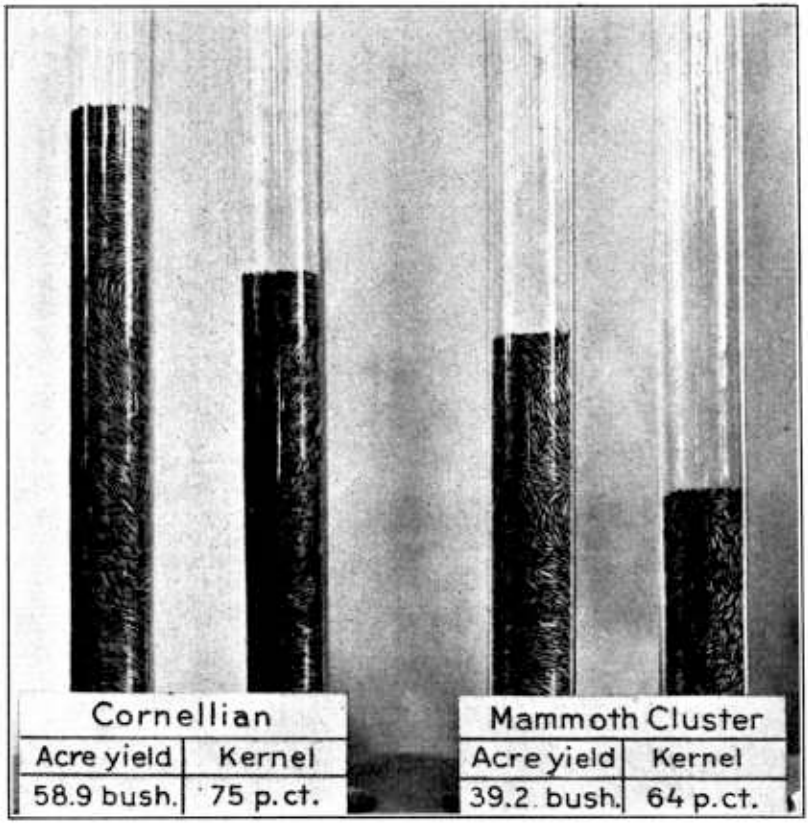

FIGURE 9.—Relative acre yields and percentages of kernel (meat) to hull in the Cornellian, a high-yielding, thin-hulled variety, and Mammoth Cluster, a low-yielding, thick-hulled variety, when grown in comparable experiments in New York

LATE VARIETIES WITH SIDE PANICLES

The late, large-strawed, large-seeded, thick-hulled varieties with side panicles, such as Storm King, Mammoth Cluster, Tartar King, and Canada Cluster, sometimes are grown in this area. As a group these varieties are much less productive than the best mid-season varieties with spreading or equilateral panicles, and they should not be grown. Farmers are attracted by their large, plump grain and good appearance in the field. However, they produce large, thick hulls (lemmas) and many so-called double grains (re-

ferred to as "bosom oats" in Canada) which give them a high percentage of hull and a low feeding value. The comparative yields of oats and kernel (meat) from Cornellian, a high-yielding, thin-hulled variety, and Mammoth Cluster, one of these side-oat varieties, obtained at Cornell University (New York) Agricultural Experiment Station, are shown in Figure 9.

Large, plump grains do not always indicate high yield and a high percentage of kernel. The proportion of kernel to hull is a very important character from the standpoint of productiveness and feeding value in any oat variety. As a result, these large varieties with side panicles can not be recommended for growing on farms in the Eastern and Northeastern States.

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